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## Guided imagery in music - A neurometric EEG/LORETA case study

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### ABSTRACT

#### Background

Musical imagery research investigates imagination of intervals, melodies and other musical elements in order to compare them to the listening process (Hubbard, 2010). This may include any imagery of sound and music where there is no physical source, e.g. when conductors study scores or composers compose without piano. Visual imagery plays an important role in music-induced emotions, especially when music is combined with narrative descriptions (Eerola & Vuoskoski, 2013). In search of invariants of altered state of consciousness (ASC) Dittrich (1998) described visual restructuring and auditory alterations as core ingredients of an ASC. Listening to music can completely absorb people, cutting off other sensory input, but absorption skills seem to be linked to music preference, imagery, hypnotisability and intensity of emotions evoked (Kreutz, Ott, Teichmann, Osawa, & Vaitl, 2008; Schäfer, Fachner, & Smukalla, 2013; Snodgrass & Lynn, 1989). In the Bonny Method of Guided Imagery and Music (GIM) a client describes images, feelings, or thoughts that occur spontaneously while eyes-closed listening to special music programs in an induced ASC (Bonny & Savary, 1973). Commonly, certain passages during the imagery process will have pivotal meaning for the traveller and become a focus in the therapy process (Grocke, 1999). Imagery is diverse including visual, auditory, somatic, direct memories, involuntary and unbidden imagery, images of significant people, places and events from the person's history<sup>5</sup>.

#### Aims

Here we are interested how spontaneously evoked and guided imagery in connection to music and ASC is processed. What happens in the brain during ASC and imagery processes of pivotal moments in GIM?

#### Method

A typical GIM session comprises an initial discussion of the client's concerns, and a focus for the music and imagery experience. The therapist provides a relaxation induction for the client who reclines with eyes closed. The therapist chooses a pre-determined music program, or spontaneously chooses music to match the client's imagery. As the music plays the client describes any imagery, feeling, or thoughts.

The EEG of an experienced GIM traveler was recorded during rest, ASC induction and listening (Imagery – music program). EEG data (Power, Asymmetry) was compared (z-scores) against a normative EEG/LORETA database (John,

1989; Thatcher, Biver, & North, 2009) investigating artifact free rest, ASC and pivotal parts of the music listening preceding verbal response. Verbal responses were analysed separately and GIM EEG data was chosen based on the ratings of an independent GIM therapist.

#### Results

A difference between rest and ASC induction indicated a state change on lower alpha (8-10 Hz). Z-scored LORETA Alpha1 power 8+9Hz bins exhibited highest z-score values in cuneus (8Hz) and precuneus (9Hz). Z-Scored LORETA power differences (inter-individual rest – ASC) were most prominent in Brodmann Area (BA) 23 (8Hz) and BA 31 (9Hz) indicating involvement of cuneus and posterior cingulate in state changes. Verbal GIM responses elicited two nodes of interest. During pivotal music listening one node exhibited a high beta anterior left temporal (T5) asymmetry decrease (resembling the ASC induction topography), while z-LORETA current density values increased in BA 37 (Left inferior / Middle temporal lobe on 21-30Hz). On lower Alpha right parietal z-score power values and z-LORETA current density increased in pre-cuneus (resembling the ASC pattern).

#### Conclusions

ASC seem to be of importance for GIM and seems to influence the music listening process. ASC related change indicates connection to visual imagery processing during GIM Music listening.

#### Keywords

Guided imagery, musical imagery, music listening, altered states of consciousness, Neurometrics, EEG, alpha1, beta, topography, asymmetry, cuneus, pre-cuneus

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